CORRESPONDENCE

ERTS

SIR,—It was somewhat enigmatic to find published in your issue of October 19 the somewhat waspish editorial "ERTS: Technological Success, Scientific Failure?" (*Nature*, **245**, 345; 1973), together with the research communication "Burning Waste Gas in Oil Fields", by T. A. Croft of Stanford University (*Nature*, **245**, 375; 1973).

The former is an ill-considered, unconvincing and poorly argued sermon on scientific and technological priorities. The latter is a dramatic illustration of the potential of imagery produced by high altitude remote sensing techniques for stimulating important economic decisions. In this particular case the profligate waste of non-renewable natural energy resources was revealed across a large area of North Africa and elsewhere. Such observations could only be made by high altitude remote sensing techniques.

While not questioning the undoubted right of your editorialist to his own views on this subject, I would nevertheless have hoped that, in a journal of the stature of *Nature*, editorials would continue to be fair and to present both sides of complex and important issues.

In Canada, the potential economic benefits of remote sensing projects such as ERTS through natural resource assessment, budgeting, and management in such areas as glaciology, hydrology, forestry, limnology, and urban planning, to name but a few, have been recognised by the setting up of a federal interdepartmental agency, the Canada Centre for Remote Sensing (and similar Provincial Agencies), to oversee the work of remote sensing applications.

ERTS has only been in existence for just over a year, during which time a vast amount of very high quality imagery has become available. A major educational effort is needed (and in some places is in process) to provide resource managers, most of whom have been trained in traditional techniques, with the necessary interpretive tools to exploit this new and relatively inexpensive technique to the full.

Satellites are here to stay. Their potential impact on many facets of contemporary applied science and economics is immense.

Yours faithfully,

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SIR,—Thumbs down to your editorial of October 19, "Technological Success, Scientific Failure?" on the Earth Resources Technology Satellite (ERTS). Perhaps you were deliberately being provocative to sting one or two of your readers into clarifying what many are unsure about, in which case, as one of the ERTS principal investigators, I swallow the bait.

Your question is too absolute. From my own field, the mapping of structural and lithological features of the African rift system from ERTS imagery, I can balance your editorial with a criticism of space-viewed geology made by Dr J. V. Hepworth[1] in 1969: "Space photography (and imagery) is a tool *additional* to aerial photography, geological and geophysical mapping, and is not an exclusive source of conclusive answers" (my emphasis). Of course the pressures have been there, as Dr Hepworth noted, to justify the enormous expense of space-viewing by the premature or even invalid seeking of conclusive answers. Ironically, you would now seem to be berating the ERTS project precisely because of its failure to find these answers.

"One cannot imagine why any geologist would be prepared to make a partial map of his area," you say. Yes, and the ERTS imagery shows that all geological maps, on a regional scale at least, have been partial in the sense of our failure to see, on the ground or from aerial photography, all the surface geological data. Despite some grossly exaggerated claims for ERTS, which incidentally have been strongly criticised by NASA scientists themselves[2], and despite some of the limitations which you yourself mention (for example, the 0930 routine), the imagery provides valuable new scientific information. For the geologist, this has enabled a revision or precision of regional structure, lithological boundaries and even of the geographical base-maps—many river courses and lake shore-lines in eastern Africa, for example, are for the first time known accurately from the ERTS imagery.

Let other scientists speak for other disciplines, but the benefits of ERTS to geology, as of Lunar Orbiters to selenology, are such that one geologist would like to say, "Thank you, NASA."

Yours faithfully,

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[1] Falcon, N. L., Gass, I. G., Girdler, R. W., and Laughton, A. S., *Phil. Trans. R. Soc.*, A, **267**, 40 (1970).

[2] Freden, S. C., and Mercanti, E. P., *Symposium on Significant Results obtained from Earth Resources Technology Satellite-1*, 3 (Discipline summary reports, NASA X-650-73-155, 1973).

Whiter than White

SIR,—Amongst the Short Notes (*Nature*, **245**, 404; 1973), the paragraph "Whiter than White" asks if the soap industry has been living in an unreal world because the use of soap per person in Britain has only increased linearly and not exponentially.

Exponential increase is best illustrated in its biological form, where any increase in population is itself capable of reproduction and there is no intrinsic limit to the increase. When increasing areas of the body receive the attention of soap, or rates increase, both areas and frequency of application have finite limits. Similarly, the washing of garments or number of eating utensils used per person must tend to a definite limit and show linear characteristics for a time. I suspect, however, that the data we have are incomplete because a linear increase means that no soap has been used much before 1825.

As a manufacturing company, our interest lies in studying the various opportunities inherent in different growth rates. When the use of a product has a growth rate of only 0.76% per annum, as shown for soap, a proper segmentation of the demand is necessary. By this is meant that specialised demand sectors, such as stainless steel razor blades, enzyme washing powders or nuclear steam boilers can have very large growth rates within an overall small increase in total demand for razor blades, soap or boilers. It is in the early recognition and in the timely development of products for these growth sectors that industries can consolidate, establish or challenge market leadership with the chance of high rewards. As seen from their annual report, Procter and Gamble have made excellent use of their experience in this by a return on capital of over 30%.

May I be permitted to re-phrase your question? Has the scientific community lived in an unreal world for the past hundred years? Can we hope that this evidence of *Nature's* study of annual reports inaugurates a new era of a symbiotic cross fertilisation between industry and science?

Yours faithfully,

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